## REMARKS

Claims 1-2 are pending in the application. No new matter has been presented.

**Rejections under 35 USC §103(a)**

**Claims 1 and 2 were rejected under 35 U.S.C. 103(a) as being obvious over Akaishi (M. Akaishi et al., "Synthesis of fine-grained polycrystalline diamond with carbonate as a sintering agent, 41st High Pressure Seminar (2000), The Japan Society of High Pressure Science and Technology, 2D01, p.108) in view of Davies (WO 02/09909).**

Responding to Applicants' previous response, the Examiner alleged as follows:

> In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); In re Merck & Co., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

(Office Action, page 5, lines 18-22). However, Applicants are not attacking the references individually, but they submit that there is no reason to combine Akaishi and Davies. The Examiner further alleges as follows:

> Specifically, Applicants arguments that the temperature and pressure conditions recited by Davies are outside of the currently claimed range is not found persuasive since that is not what Davies is relied upon for teaching. **Davies is cited to show the known method of making a polycrystalline diamond body without the use of a sintering aid. The currently claimed heating temperature and pressure conditions in making such a body are shown as known in Akaishi.**

(Office Action, page 6, lines 1-6, emphasis added). However, the teaching of the different references cannot be arbitrarily combined.

The heat-resistant diamond composite sintered body of the present invention does not contain any sintering aid, and the diamond composite sintered body is prepared by sintering an ultrafine-grain synthetic diamond powder having an average grain size of 200 nm or less, and the composite sintered body has a Vickers hardness of 85 GPa or more.

It was a common sense for a person of ordinary skill in the art at the time of the invention that sintering aid is necessary to obtain a heat-resistant diamond composite sintered body with high strength and Vickers hardness. Akaishi would be an example showing that sintering aid was necessary to obtain a heat-resistant diamond composite sintered body.

Claim 1 recites "the diamond composite sintered body is prepared by sintering an ultrafine-grain synthetic diamond powder having an average grain size of 200 nm or less." Davies describes the particle size as follows: "the defined maximum particle size is typically 60 microns, preferabley 50 microns, with a **lower limit of particle size of about 0.1 microns**" (Davies, page 8, last paragraph). In Davies, Example 1 uses diamond crystals of the size range of 3 to 5 microns, and Example 2 uses diamond crystals of the size range of 0.5 to 1 micron. If the particle sizes are normally-distributed, the average particle size of Example 1 is about 4 μm, and that of Example 2 is about 750 nm. These average particle sizes are by far greater than that of the present invention. It should be noted that the present specification compares the present invention with Comparative Example 2 which uses diamond powder with **average particle diameter of 300 nm**. Despite the Examiner's allegation, Davies does not teach or suggest sintering an ultrafine-grain synthetic diamond powder having "an **average grain size of 200 nm or less**,"

The same thing can be said about Akashi et al. Akashi et al. describes that natural diamond powder of 0 to1 μm was used. This indicates that the particle size of the natural diamond powder is

in the range of 0 to1 μm. If the particle sizes in Akashi et al. distribute with normal distribution, the average particle size is 500 nm, which does not satisfy the "**average grain size of 200 nm or less**."

Thus, neither Davies nor Akashi teaches or suggests sintering an ultrafine-grain synthetic diamond powder having "an average grain size of 200 nm or less."

Claim 1 recites that the heat-resistant diamond composite sintered body has a Vickers hardness of 85 GPa or more. On the other hand, Davies discloses an abrasive product of much less strength and Vickers hardness. In Davies, synthetic diamond crystals in a titanium metal canister is heated and pressurized in the pressure range of 3 to 6 GPa and in a temperature range of as low as about 750 to 1400°C (Davies, page 6, second full paragraph). These conditions yield only low-strength products with 10 to 25 vol% porosity.

Therefore, the fact that the abrasive product of Davies is free of non particle matter has nothing to do with the heat-resistant diamond composite sintered body having a Vickers hardness of 85 GPa or more. It was present inventors who discovered that a heat-resistant diamond composite sintered body having a Vickers hardness of 85 GPa or more is obtained without using sintering aid.

Moreover, the present invention have unexpected results. Akaishi discusses synthesis of fine-grained polycrystalline diamond with carbonate as a sintering agent, and it reports that the average Vickers hardness was 70±5 GPa (Akaishi page 7, Concluding remarks). It was not expected that such a high hardness is obtained without sintering aid.

Thus, there is no reason for a person of ordinary skill in the art to combine Akaishi and Davies and arrive at the heat-resistant diamond composite sintered body of the present invention as recited in claim 1.

For at least these reasons, claim 1 patentably distinguishes over Akaishi and Davies.

**Claim 2**

Claim 2 recites, among other things, the steps of "enclosing a synthetic diamond powder with no sintering aid in a capsule made of Ta or Mo, said synthetic diamond powder having an average grain size of 200 nm or less," and "heating and pressurizing the capsule under thermodynamically stable conditions of a temperature of 2100°C or more and a pressure of 7.7 GPa or more."

As already mentioned, it was a common sense for a person of ordinary skill in the art at the time of the invention that sintering aid is necessary to obtain a heat-resistant diamond composite sintered body with high strength and Vickers hardness. Akaishi uses sintering aid to obtain a heat-resistant diamond composite sintered body.

While claim 2 recites "heating and pressurizing the capsule under thermodynamically stable conditions of a temperature of 2100°C or more and a pressure of 7.7 GPa or more," in Davies, synthetic diamond crystals in a titanium metal canister is heated and pressurized in the pressure range of 3 to 6 GPa and in a temperature range of as low as about 750 to 1400°C (Davies, page 6, second full paragraph). These conditions yield only low-strength products with 10 to 25 vol% porosity.

In the comparative example 1 of the present specification, a sintering treatment was performed in the same manner as that in Inventive Example 1 except that a sintering temperature was set at 2000°C. The obtained sintered body has poor grinding resistance, and an average value of Vickers hardness was 50 GPa. The fact indicates that the importance of the sintering temperature of the present invention.

Thus, there is no reason for a person of ordinary skill in the art to combine Akaishi and Davies and arrive at the method of producing a heat-resistant diamond composite sintered body as recited in claim 2.

For at least these reasons, claim 2 patentably distinguishes over Akaishi and Davies.

**Corresponding Applications**

Although patent system differs from country to country, it is noted that corresponding applications have been patented in Japan, Korea, China, Russia, and South Africa.

In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,
**WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP**

/Sadao Kinashi/

Sadao Kinashi
Attorney for Applicants
Registration No. 48,075
Telephone: (202) 822-1100
Facsimile: (202) 822-1111

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